

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Michael G. Proctor et al.

Group Art Unit: 1796

Serial No.: 10/581,563

Examiner: Margaret G. Moore

Filed: June 2, 2006

For: METHOD OF MAKING KAOLIN CONTAINING SILICONE RUBBER COMPOSITIONS

Attorney Docket Number: 71,049-012

DECLARATION UNDER 37 C.F.R. § 1.132

Mail Stop RCE
Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

I, Michael G. Proctor, hereby state that:

1. I am a citizen of the United Kingdom.
2. I am currently employed as a Senior Product Steward and Silicone Rubber Development Chemist for Dow Corning Ltd. of Wales. I have worked in the field of silicone chemistry for 13 years and I have been employed by Dow Corning Ltd. since 1996. I earned a PhD in physical inorganic chemistry in 1988 at the University of Sussex in Brighton, UK.
3. I am the first named inventor of the pending application, Application Serial No. 10/581,563, and a person highly skilled in the art of silicone rubber development and formulation.

4. As a brief summary of silicone rubbers and fillers used therein, it is important to note that silicone rubbers are typically composed of three essential ingredients: (i) a silicone polymer, (ii) a curing (i.e., cross-linking) agent, and (iii) one or more fillers. Two different types of fillers are generally used in silicone rubbers and are defined as reinforcing or non-reinforcing fillers. Reinforcing fillers impart high strength to silicone rubbers and typically include fumed and precipitated silica. However, reinforcing fillers are relatively expensive and increase the cost of the silicone rubber for the purchaser. The reinforcing fillers are also typically treated with organosilanes, organosiloxanes, or organosilazanes in order to improve the physical and/or mechanical properties of the silicone rubbers, e.g. tensile strength and compression set. Non-reinforcing fillers, on the other hand, do not reinforce the silicone rubbers and are generally used to reduce the cost of the silicone rubbers. Typically, the non-reinforcing fillers include relatively inexpensive materials such as ground quartz, calcium carbonate, and diatomaceous earth.

5. The claimed invention of the '563 application is a treated kaolin containing silicone rubber composition and a method of making the composition. The silicone rubber composition includes a specific silicone polymer, treated kaolin, a curing agent, and optional additives. Importantly, the composition is free of reinforcing fillers. The goal in developing this invention was to form a silicone rubber composition that has similar physical properties and mechanical strength as a reinforced silicone rubber (i.e., a silicone rubber which uses the more expensive reinforcing fillers) but with less cost and greater ease of use. The treated kaolin is both cheaper and easier to use than reinforcing fillers and thus achieves the goal of this invention.

6. The kaolin of this invention is treated with silanes, silazanes, or short chain organopolysiloxane polymers to prevent an acidic surface of the untreated kaolin from causing degradation of the silicone polymer in the silicone rubber composition. However, this treated kaolin is not a reinforcing filler or a non-reinforcing filler. Instead, the treated kaolin is defined as a "semi-reinforcing filler," as set forth in paragraphs [0033] and [0034] of the application. The treated kaolin is defined as a "semi-reinforcing filler" because it increases the mechanical and physical properties of the silicone rubber composition to a level much greater than would be obtained with an equivalent amount of a non-reinforcing filler but to a lesser extent than would be obtained using an equivalent amount of a reinforcing filler.

By utilizing the treated kaolin instead of any type of filler, the invention avoids the need to follow a conventional production route to form a silicone rubber as outlined in paragraph [0030] of the application. In other words, the invention avoids the need to (1) make a silicone rubber base containing fumed silica as a reinforcing filler and then (2) make another composition including a secondary non-reinforcing or semi-reinforcing filler, thus greatly saving costs and production times. In addition, the invention avoids a need to apply heat during production of the silicone rubber base because silica-type reinforcing fillers need not be reacted with hydrophobing agents as would typically be required. Because the invention does not have to be heated, the invention can be made in a single mixer, thereby further decreasing production times, decreasing production costs, and maximizing production flexibility and efficiency. Further, the treated kaolin of the invention disperses much more easily in silicone rubbers than fumed silica thereby reducing the total mixing time required to produce a homogeneous product. Still further, the treated kaolin of the invention is inexpensive and thus can be used in greater amounts to precisely customize the silicone rubber composition to specific applications thereby increasing

marketability and usefulness. Even further, the treated kaolin of the invention has a much higher bulk density than fumed silica which eases handling and storage requirements of the silicone rubber composition.

7. I am aware of, have read, and understand the disclosure of U.S. Pat. No. 6,737,458 which is entitled "Silicone Compositions Having Improved Heat Stability."

8. I am also aware of, have read, and understand the disclosure of U.S. Pat. No. 4,677,141 which is entitled "Method of Improving Heat Stability of Pigmentable Silicone Elastomer."

9. As a result of my review of the '458 and '141 patents, and also as a result of my understanding from the perspective of one highly skilled in the art of silicone rubber development and formulation, it is clear that combining the '458 patent and the '141 patent would not produce the silicone rubber composition of the instant invention. This combination of references will not achieve the goal of forming a silicone rubber composition that has similar physical properties and mechanical strength to a reinforced silicone but with less cost and greater ease of use. In fact, this combination will produce results that are contrary to the goals achieved with the instant invention and will merely recreate the already known deficient products that are currently produced in the art.

10. The '458 Patent

Goals of the '458 Patent

As a result of my understanding of the '458 patent, it is apparent that the '458 patent provides a silicone elastomer that includes both reinforcing and non-reinforcing fillers and has improved heat stability. The '458 patent specifically notes that use of talc and other typical non-reinforcing fillers causes considerable weight loss in silicone compositions at temperatures

above 100°C due to cleavage of siloxane chains and catalysis of reactions that form cyclic, volatile siloxanes. Accordingly, in the '458 patent, a silicone elastomer is formed and includes 20-99 weight percent of vinyl functional polydimethylsiloxane (PDMS) and 1 to 80 weight percent of treated non-reinforcing fillers that are preferably talc and quartz. The non-reinforcing fillers are treated with nitrogen containing compounds to improve the heat stability of the silicone elastomer and minimize the aforementioned cleavage and weight loss.

Deficiencies of the '458 Patent

It is very important to realize that the '458 patent does not form a useable silicone elastomer through use of the vinyl functional PDMS and the non-reinforcing fillers alone. It is very well known and recognized in the silicone arts that a vinyl functional PDMS, by itself or simply mixed with non-reinforcing fillers, is elastomeric in a sense that it is rubbery but has such poor mechanical properties that it cannot be used to make useful articles. Accordingly, reinforcing fillers must be included in order for any sort of useable elastomer to be formed. Without reinforcing fillers, the product formed in the '458 patent would be better described as a coating or cross-linkable fluid and not as an elastomer. Thus, the '458 patent describes the inclusion of reinforcing fillers such as precipitated and pyrogenic silicic acid and their preferred inclusion to allow the elastomer to have sufficient mechanical strength to make it useful in practical applications. In sum, the reinforcing fillers must be included in the silicone elastomer of the '458 patent in order for any sort of useable article to be formed.

Furthermore, and as admitted to by the Examiner, the '458 patent does not disclose, teach, or suggest use of any treated kaolin whatsoever, let alone treated kaolin specifically as a semi-reinforcing filler. In fact, the treated kaolin of this invention cannot even be substituted for the non-reinforcing filler of the '458 patent because the treated kaolin is not a "non-reinforcing

filler." The treated kaolin is a "semi-reinforcing filler," as described above. It is well known and appreciated in the art of silicone rubbers that non-reinforcing fillers are not the same as semi-reinforcing fillers and thus cannot simply be used interchangeably. Said differently, it is well recognized in the art that the use of the terminology "non-reinforcing filler" implies that the fillers have no effect on improving mechanical properties of the compositions. That simply is not the case with this invention. The treated kaolin of the instant invention is used as a substitute for reinforcing fillers and increases the mechanical and physical properties of the silicone rubber compositions in which it is utilized thus allowing a silicone rubber to be formed with less cost and in less time. Accordingly, the '458 patent does not even include use of an analogous type filler of and should not be relied upon when trying to "reconstruct" the invention.

11. The '141 Patent

As a result of my understanding of the '141 patent, it is apparent that the '141 patent provides a method of improving the heat stability of a pigmentable silicone elastomer composition. Notably, the silicone elastomer composition specifically requires a polydiorganosiloxane gum, a reinforcing filler, and white clay. The '141 patent relies on the reinforcing fillers "to improve the physical strength" of the elastomer (See Col. 3, Line 6-7). Quite simply, the elastomer would not achieve the required mechanical strength without the inclusion of the reinforcing fillers.

In addition, the '141 patent uses the white clay merely as a heat stability additive. Notably, the '141 patent does not explain or even acknowledge any reinforcing effect of the white clay whatsoever. The white clay is used in amounts of from 1 to 150 parts by weight to 100 parts by weight of the polydiorganosiloxane gum. According to '141 white clay is detrimental to the mechanical properties of silicone compositions. Thus according to '141 the

large loading of white clay actually weakens the mechanical properties of the silicone elastomer thereby increasing the reliance on the reinforcing fillers to form a useable elastomer. Furthermore, the '141 patent describes the "treatment" of the white clay with vinyl-tris(beta-methoxyethoxy)silane (see Col. 4, Lines 49-50). However, it is important to realize that this "treatment" is not analogous to the treatment of the fillers in the '458 patent or analogous to the treatment of the kaolin of the instant invention. The white clay of the '141 patent is "treated" to add vinyl functionality to the surface of the white clay so that it is reactive. The white clay is not treated to prevent its presence from causing degradation of the silicone polymer. Accordingly, there is no overlap or similarity with the treated kaolin of the invention. In view of all of the dissimilarities and deficiencies described above, the '141 patent should not be relied upon when trying to reconstruct the invention.

12. Relying on the '141 Patent Is Not Proper or Obvious

As one of high skill in the art, it is my opinion that relying on the '141 patent, or for that matter any patent that requires the use of reinforcing fillers, to form the instant invention is certainly not predictable. Instead, relying on the '141 patent would be detrimental because of the fact that '141 actually teaches that the use of large loadings of white clay weakens the mechanical properties of the silicone elastomer composite thus increasing the reliance on reinforcing fillers. Reinforcing fillers are expensive, have specific processing requirements, tend to cause crepe hardening, and are not easily used in single mixer applications. Thus, no one of skill in the silicone arts would look to a reference that relies on reinforcing fillers when trying to design a composition that is free of those same fillers.

In fact, as set forth in paragraphs [0008] and [0037] of the application, the technology of the '141 patent was specifically avoided when developing the instant invention. Said

differently, the instant invention was explicitly intended to be an improvement of the '141 patent and its deficiencies. The '141 patent utilizes heat to cause a chemical reaction between a "treating agent" and the surface of the reinforcing filler. In addition, the '141 patent specifically requires the use of reinforcing fillers. This is precisely what was designed around and improved upon. As described above, the use of reinforcing fillers is undesirable for many reasons including cost and processing considerations. The instant invention improves cost and processing considerations and greatly minimizes the deficiencies of the '141 patent by forming an entirely different type of composition that is free of reinforcing fillers.

13. Combining The '458 Patent and the '141 Patent Would Not Produce a Useful Result

Even if the lessons from the '458 patent and the lessons from the '141 patent were combined to form a silicone composition, this "resultant" silicone composition would always include reinforcing fillers. A useable product simply could not be formed from these patents without the reinforcing fillers. Thus, the problems associated with a need to use heat, with a need to use multiple mixers, with costs and other processing considerations, and with ease of handling and ease of storage would not be solved. In fact, there would likely be no difference between this "resultant" silicone composition and the many commercial compositions that are currently available. Said differently, a silicone composition formed from this combination of references would merely represent the current commercial products with all of their limitations and deficiencies, would fail to offer any improvement over the prior art whatsoever, and certainly would not be representative of the instant invention.

14. Conclusion

As a result of my review of the '458 and '141 patents, and also as a result of my understanding from the perspective of one highly skilled in the art of silicone rubber development

and formulation, it is clear that combining the disclosure of the '458 patent and the disclosure of the '141 patent will not produce a useful result and will certainly not re-produce the instant invention. Quite simply, no matter how the '458 and '141 patents are combined, any silicone formed from therefrom will necessarily include reinforcing fillers. This alone negates the advantages of the instant invention. In addition, this combination will rely on the technology of the '141 patent which was expressly designed around due to its inconsistencies and disadvantages.

15. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information are believed to be true, and further that these statements were made with the knowledge that willful and false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or patent issued thereon.

Respectfully submitted,

Dated 24-04-09

M G Proctor

Michael Gavin Proctor